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NGUYEN, PHUONGCHAU BA	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/749,903	Applicant(s) SADRI ET AL.	
	Examiner Phuongchau Ba Nguyen	Art Unit 2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 29 December 2003.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-33 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) _____ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 29 December 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 9-3-4;7-28-5;3-20-6.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claims 31-33 are rejected under 35 U.S.C. 101 because the original disclosure discloses machine readable medium as propagated signals (carrier waves, infrared signals, digital signals, etc.) in paragraph 0054. Applicant is directed to MPEP 2106 wherein "*When nonfunctional descriptive material is recorded on some computer-readable medium, in a computer or on an electromagnetic carrier signal, it is not statutory since no requisite functionality is present to satisfy the practical application requirement. Merely claiming nonfunctional descriptive material, i.e., abstract ideas, stored on a computer-readable medium, in a computer, or on an electromagnetic carrier signal, does not make it statutory. See >Diamond v.< Diehr, 450 U.S. *>175,< 185-86, 209 USPQ *>1,< 8 (noting that the claims for an algorithm in Benson were unpatentable as abstract ideas because "[t]he sole practical application of the algorithm was in connection with the programming of a general purpose computer."). Such a result would exalt form over substance. In re Sarkar, 588 F.2d 1330, 1333, 200 USPQ 132, 137 (CCPA 1978)("[E]ach invention must be evaluated as claimed;*"

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-6, 9, 22-29 are rejected under 35 U.S.C. 102(e) as being anticipated by Ido (US 2006/0166634 A1).

Regarding claim 1,

Ido (US 2006/0166634 A1) discloses a receiver comprising:

antenna selection circuitry (signal selector 61 in selector 33-fig.1) to select more than one of a plurality of spatially diverse antennas to receive an

orthogonal frequency division multiplexed symbol over a wideband channel comprising a plurality of subchannels; and

combining circuitry (combiner 62 in selector 33-fig.1) to combine corresponding frequency domain symbol-modulated subcarriers from the selected antennas to generate combined symbol-modulated subcarriers for each subchannel of the wideband channel.

Regarding claim 2, Ido further discloses wherein each subchannel of the wideband channel comprises a plurality of orthogonal frequency division multiplexed subcarriers, and wherein each subcarrier of an associated subchannel has a null at substantially a center frequency of other subcarriers of the associated subchannel (0029-0030, 0038, 0057).

Regarding claim 3, Ido further discloses wherein the combining circuitry comprises maximum-ratio combining circuitry to combine the corresponding

frequency domain symbol-modulated subcarriers of the subchannels, and wherein the combining circuitry comprises maximum-ratio combining circuitry to weight at least some of the frequency domain symbol-modulated subcarriers prior to combining the corresponding frequency domain symbol-modulated subcarriers substantially proportional to signal strength (0057-0058 & 0065-0067).

Regarding claim 4, Ido further discloses wherein parallel groups of time domain samples are to be generated from each of the subchannels received by each of the antennas, and wherein the receiver further comprises fast Fourier transform circuitry (FFT 42 & 52-fig.1) to perform fast Fourier transforms on the parallel groups of time domain samples (see fig.1).

Regarding claim 5, Ido further discloses wherein the antenna selection circuitry it so select a first antenna of the plurality of antennas to receive the

subchannels of the wideband channel, wherein the antenna selection circuitry is to select a second antenna of the plurality of antennas to further receive the subchannels of the wideband channel, and wherein the antenna selection circuitry is to select the first and the second antennas from the plurality based on an average signal-to-noise ratio of signals in the subchannels (0048-0049 & 0060-0063).

Regarding claim 6, Ido further discloses comprising:

low-noise amplifiers (AGC 13-fig.1) to amplify radio-frequency signals of at least both subchannels;

downconversion circuitry (demodulator 46-fig.1) to downconvert radio-frequency signals for each subchannel received through each antenna; and

analog-to-digital conversion circuitry (ADC 14-fig.1) to generate digital signals for each subchannel received through each antenna.

Regarding claim 9, Ido further discloses comprising: equalizer circuitry (33-equalizer) to perform separately for the more than one subchannel, a channel equalization on the combined symbol-modulated subcarriers of an associated subchannel provided by the combining circuitry (0046-0049).

Regarding claim 22,

Ido discloses a receiver comprising: radio-frequency circuitry (AGC 13-fig.1) to receive an orthogonal frequency division multiplexed symbol over a subchannel through a plurality of spatially diverse antennas; and maximum-ratio combining circuitry (Gain combiner 62-fig.1) to combine corresponding frequency domain symbol-modulated subcarriers from each of the antennas to generate combined symbol-modulated subcarriers for the subchannel.

Regarding claim 23, Ido further discloses wherein the subchannel comprises a plurality of orthogonal frequency division multiplexed subcarriers, wherein each

subcarrier of an associated subchannel has a null at substantially a center frequency of other subcarriers of the associated subchannel (0029-0030, 0038, 0057), and wherein the maximum-ratio combining circuitry is to weight the frequency domain symbol-modulated subcarriers prior to combining the corresponding frequency domain symbol-modulated subcarriers substantially proportional to their signal strength (0060 & 0065-0067).

Regarding claim 24, Ido further comprises:

processing circuitry (demodulator 46-fig.1) to generate parallel groups of time domain samples from signals received by each of the antennas; and

fast Fourier transform circuitry (FFT 42-fig.1) to perform fast Fourier transforms on the parallel groups of time domain samples to generate the frequency domain symbol-modulated subcarriers from signals received by each antenna, the processing circuitry (demodulator 46-fig.1) to generate a single decoded bit stream representing the orthogonal frequency division multiplexed

symbol from the parallel groups of bits of the subchannel received by each antenna (0054).

Regarding claim 25,

Ido discloses a system comprising:

a plurality of substantially omnidirectional spatially diverse antennas (11 & 21-fig.1);

antenna selection circuitry (selector 61-fig.1) to select more than one of the antennas to receive an orthogonal frequency division multiplexed symbol over a wideband channel comprising a plurality of frequency-separated subchannels; and

maximum-ratio combining circuitry (combiner 62-fig.1) to combine corresponding frequency domain symbol-modulated subcarriers from the

selected antennas to generate combined symbol-modulated subcarriers for each subchannel of the wideband channel.

Regarding claim 26, Ido further discloses wherein each subchannel of the wideband channel comprises a plurality of orthogonal frequency division multiplexed subcarriers, wherein each subcarrier of an associated subchannel has a null at substantially a center frequency of other subcarriers of the associated subchannel (0029-0030, 0038, 0057), and wherein the maximum-ratio combining circuitry is to weight the frequency domain symbol-modulated subcarriers prior to combining the corresponding frequency domain symbol-modulated subcarriers substantially proportional to the signal strength of an associated subcarrier (0060 & 0065-0067).

Regarding claim 27, Ido discloses wherein parallel groups of time domain samples are to be generated from each of the subchannels received by each of

the antennas, wherein the system further comprises fast Fourier transform circuitry (FFT 42-fig.1) to perform fast Fourier transform on the parallel groups of time domain samples, wherein the antenna selection circuitry (selector 61-fig.1) is to select a first antenna of the plurality of antennas to receive the subchannels of the wideband channel, wherein the antenna selection circuitry (61-fig.1) is to select a second antenna of the plurality of antennas to further receive the subchannels comprising the wideband channel, wherein the antenna selection circuitry (61-fig.1) is to select the first and the second antennas from the plurality based on an average signal-to-noise ratio of signals in the individual subchannels (0060), and wherein the system further comprises: downconversion circuitry (Tuner 12-fig.1) to individually downconvert radio-frequency signals for each subchannel and received through each antenna; and analog-to-digital conversion circuitry (ADC 14-fig.1) to generate digital signals for each subchannel received through each antenna.

Regarding claim 28,

Ido discloses a reconfigurable receiver comprising: antenna selection circuitry (selector 61-fig.1) to select one or more of a plurality of spatially diverse antennas to receive one or more of a plurality of subchannels; and maximum-ratio combining circuitry (combiner 62-fig.1) to combine, when more than one antenna per subchannel is selected, corresponding symbol-modulated subcarrier of subchannels from different selected antennas.

Regarding claim 29, Ido further discloses wherein the antenna selection circuitry (selector 61-fig.1) is to select at least one antenna of the plurality to receive either three or four subchannels when a high-throughput mode is enabled, wherein the antenna selection circuitry is to select up to four of the antennas to receive a single subchannel when an increased-range mode is enabled, and wherein the antenna selection circuitry is to select at least two of the antennas to simultaneously receive two of the subchannels when the

increased-range and the high-throughput modes are enabled, wherein the antenna selection circuitry is to select the antennas based on an average signal-to-noise ratio of the subchannels (0046-0048 & 0057-0060).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 10-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ido (US 2006/0166634 A1) in view of Walton (US 2003/0043732 A1).

Regarding claim 10,

Ido discloses all the claimed limitations, except (1) subcarrier demappers to demap, after the channel equalization, the combined symbol-modulated

subcarriers of each subchannel to generate parallel groups of bits from the subcarriers; and (2) additional processing circuitry to generate a single decoded bit stream representing the orthogonal frequency division multiplexed symbol from the parallel groups of bits of the more than one subchannel. However, in the same field of endeavor, Walton (US 2003/0043732 A1) discloses subcarrier demappers (Demode & De-Interleaver 730a-fig.7) to demap, after the channel equalization, the combined symbol-modulated subcarriers of each subchannel to generate parallel groups of bits from the subcarriers; and additional processing circuitry (Decoder 730a-fig.7) to generate a single decoded bit stream representing the orthogonal frequency division multiplexed symbol from the parallel groups of bits of the more than one subchannel (0200 & see also fig.6a), corresponding to (1-2). Therefore, it would have been obvious to an artisan to apply Walton's teaching to Ido's system with the motivation being to improve performance using only good channels in each group and matching the data processing for the selected channels to the capacity achievable by the channels.

Regarding claim 11,

Ido discloses all the claimed limitation, except (1) wherein the subcarrier demappers are to demap the subcarriers of each subchannel in accordance with individual subcarrier modulation assignments particular to the subchannel to generate the parallel groups of bits. However, in the same field of endeavor, Walton discloses wherein the subcarrier demappers (Demod & De-Interleaver 730a-fig.7) are to demap the subcarriers of each subchannel in accordance with individual subcarrier modulation assignments particular to the subchannel to generate the parallel groups of bits (0200), corresponding to (1). Therefore, it would have been obvious to an artisan to apply Walton's teaching to Ido's system with the motivation being to improve performance using only good channels in each group and matching the data processing for the selected channels to the capacity achievable by the channels.

Regarding claim 12,

Ido discloses a method comprising:

selecting (selector 61-fig.1) at least two antennas from a plurality of antennas to receive more than one subchannel of a wideband channel, the subchannels comprising a plurality of orthogonal frequency division multiplexed subcarriers ;

combining (combiner 62-fig.1) corresponding frequency domain symbol-modulated subcarriers of the subchannels to generate combined symbol-modulated subcarriers for each subchannel.

Ido discloses all the claimed limitations, except (1) processing the combined symbol-modulated subcarriers to demodulate an orthogonal frequency division multiplexed symbol from the more than one subchannel. However, in the same field of endeavor, Walton discloses Demod 730a-fig.7 (0200 & see also fig.6a), corresponding to (1). Therefore, it would have been obvious to an artisan to apply Walton's teaching to Ido's system with the

motivation being to improve performance using only good channels in each group and matching the data processing for the selected channels to the capacity achievable by the channels.

Regarding claim 13, Ido further discloses performing fast Fourier transforms (FFT 42 & 52, fig.1) on parallel groups of time domain samples for the subchannels received through each of the antennas, wherein the combining comprises maximum-ratio combining comprising weighting at least some of the frequency domain symbol-modulated subcarriers and proportionally combining the weighted frequency domain symbol-modulated subcarriers of the more than one subchannel, and wherein the proportionally combining comprises combining the frequency domain symbol-modulated subcarriers substantially proportional to their signal strength (0046-0049).

Regarding claim 14, Ido further discloses wherein selecting comprises: selecting a first pair of antennas of the plurality of antennas to receive one subchannel of the wideband channel (0047-0048); selecting a second pair of antennas of the plurality of antennas to further receive the one subchannel of the wideband channel (0047-0048); and selecting the first and the second pairs of antennas from the plurality based on a signal-to-noise ratio of signals of the subchannel (0047-0048).

Regarding claim 15, Ido further comprises: amplifying (AGC 13&23-fig.1), for each selected antenna, radio-frequency signals of the more than one subchannel; individually downconverting (via OFDM demodulator 46 & 54-fig.1) the radio-frequency signals separately for each subchannel and received through each antenna; and generating digital signals for each subchannel received through each antenna (ADC 14 & 24 -fig.1).

Regarding claim 16, Ido further comprises performing a channel equalization (via Equal Gain 33-fig.1) separately for the more than one subchannel on the combined symbol-modulated subcarriers of an associated subchannel.

Regarding claim17, Ido discloses all the claimed limitations, except (1) demapping, after performing the channel equalization, the combined symbol-modulated subcarriers of each subchannel to generate parallel groups of bits from the subcarriers; and (2) processing the parallel groups of bits of the more than one subchannel to generate a single decoded bit stream representing the orthogonal frequency division multiplexed symbol.

However, in the same field of endeavor, Walton discloses Demod & De-Interleaver 730a-fig.7 and Decoder-730a-fig.7 & see also 0200 and fig.6a, corresponding (1-2). Therefore, it would have been obvious to an artisan to apply Walton's teaching to Ido's system with the motivation being to improve

performance using only good channels in each group and matching the data processing for the selected channels to the capacity achievable by the channels.

Regarding claim 18, Ido discloses all the claimed limitations, except (1) wherein the demapping comprises demapping the subcarriers of each subchannel in accordance with individual subcarrier modulation assignments particular to the subchannel to generate the parallel groups of bits.

However, in the same field of endeavor, Walton discloses Demod & De-Interleaver 730a-fig.7 and see 0200 & fig.6a, corresponding to (1). Therefore, it would have been obvious to an artisan to apply Walton's teaching to Ido's system with the motivation being to improve performance using only good channels in each group and matching the data processing for the selected channels to the capacity achievable by the channels.

Regarding claim 19,

Ido discloses a receiver comprising:

antenna selection circuitry (61-fig.1) to select one or more of a plurality of spatially diverse antennas to receive an orthogonal frequency division multiplexed symbol over a wideband channel comprising more than one of a plurality of subchannels; and

subcarrier demodulators (46 & 54-fig.1) to demodulate frequency domain symbol-modulated subcarriers of the more than one subchannel to generate parallel groups of bits from the subcarriers.

Ido discloses all the claimed limitations, except (1) wherein the processing circuitry is to generate a single decoded bit stream representing the orthogonal frequency division multiplexed symbol from the parallel groups of bits of the more than one subchannel. However, in the same field of endeavor, Walton discloses Decoder 730a-fig.7 & fig.6a and see 0200, corresponding to (1). Therefore, it would have been obvious to an artisan to apply Walton's

teaching to Ido's system with the motivation being to improve performance using only good channels in each group and matching the data processing for the selected channels to the capacity achievable by the channels.

Regarding claim 20, Ido further discloses wherein each subchannel of the wideband channel comprises a plurality of orthogonal frequency division multiplexed subcarriers, wherein each subcarrier of an associated subchannel has a null at substantially a center frequency of other subcarriers of the associated subchannel (0029-0030, 0038, 0057), and wherein the antenna selection circuitry (61-fig.1) selects the one or more antennas from the plurality based on a signal-to-noise ratio of signals of the subchannels (0060).

Regarding claim 21, Ido further discloses:

downconversion circuitry (Tuner 12-fig.1) to individually downconvert radio-frequency signals for each subchannel;

analog-to-digital conversion circuitry (ADC 14-fig.1) to generate digital signals for each of the subchannels;

processing circuitry (demodulator 46-fig.1) to generate parallel groups of time domain samples from the digital signals of each of the subchannels; and

fast Fourier transform circuitry (FFT 41-fig.1) to perform fast Fourier transforms on the parallel groups of time domain samples to generate the frequency domain symbol-modulated subcarriers for each of the subchannels for subcarrier demodulation.

7. Claims 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ido (US 2006/0166634 A1) in view of Shao (US 2004/0258174 A1).

Regarding claim 31,

Ido discloses selecting (selector 61-fig.1) at least two antennas from a plurality of antennas to receive more than one subchannel of a wideband channel, the subchannels comprising a plurality of orthogonal frequency

division multiplexed subcarriers; combining (combiner 62-fig.1) corresponding frequency domain symbol-modulated subcarriers of the subchannels to generate combined symbol-modulated subcarriers for each subchannel; and processing (demodulator 46-fig.1) the combined symbol-modulated subcarriers to demodulate an orthogonal frequency division multiplexed symbol from the more than one subchannel.

Ido discloses all the claimed limitations, except (1) a machine-readable medium that provides instructions which, when executed by one or more processors, cause said processors to perform operations. However, in the same field, Shao (US 2004/0258174 A1) further discloses diversity system in multicarrier communication channel having machine readable (storage) medium 800 (0084), corresponding to (1). Therefore, it would have been obvious to an artisan to implement Ido's teaching into computer/machine processing product with the motivation being to ease the upgrade processing and cost saving.

Regarding claim 32, Ido further discloses wherein the instructions, when further executed by one or more of said processors, cause said processors to perform operations further comprising: performing fast Fourier transforms (FFT 42-fig.1) on parallel groups of time domain samples for the subchannels received through each of the antennas, wherein the combining (combiner 62-fig.1) comprises maximum-ratio combining comprising weighting at least some of the frequency domain symbol-modulated subcarriers and proportionally combining the weighted frequency domain symbol-modulated subcarriers of the more than one subchannel, and wherein the proportionally combining comprises combining the frequency domain symbol-modulated subcarriers substantially proportional to their signal strength (0046-0048 & 0055-0060).

Regarding claim 33, Ido further discloses wherein the instructions, when further executed by one or more of said processors, cause said processors to perform operations further comprising: selecting (selector 61-fig.1) a first pair of antennas of the plurality of antennas to receive the more than one subchannel

of the wideband channel; selecting (selector 61-fig.1) a second pair of antennas of the plurality of antennas to further receive the more than one subchannel of the wideband channel; and selecting the first and the second pairs of antennas from the plurality based on a signal-to-noise ratio of signals in the subchannels (0057-0060).

Allowable Subject Matter

8. Claims 7-8, 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phuongchau Ba Nguyen whose telephone number is 571-272-3148. The examiner can normally be reached on Monday-Friday from 10:00 a.m. to 6:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on 571-272-3155. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Phuongchau Ba Nguyen
Examiner
Art Unit 2616